REMARKS

No response was ever received from the Examiner to the Letter mailed to the Patent and Trademark Office on May 3, 2000, requesting clarification of the Examiner's Office Action. This response, therefore, is being filed, responding to the Examiner's Office Action as best understood.

New claims 23 through 29 have been added above. Basis for new claims 23 to 29 is found in the present claims and at the description at page 1 paragraph 2, page 43 last paragraph, figure 12 and page 36 last paragraph.

In paragraph 1 on page 2 of the Office Action Claims 1-6, 8 and 10-22 are rejected under 35 U.S.C. §101. This rejection is respectfully traversed for the reasons explained below.

It is respectfully submitted that "...detecting of anomalies in the transmission of messages by an entity..." is concrete and tangible. In *State Street Bank*, the claimed invention specified a method of transforming data, representing discrete dollar amounts, to produce a final share price. This was held to be a practical application of a mathematical algorithm because it produced a useful, concrete and tangible result which was a final share price. It is submitted that "detecting anomalies in the transmission of messages by an entity" is a practical application of a method which produces a useful result, of derived anomalies, which are at least as useful, concrete and tangible as a share price or dollar amount.

The claims of the present application do not specify a theory or principle that can be carried out by thought alone and which is abstracted from any particular practical application. The Examiner states that the Applicant's invention is disclosed abstractly from any limitations to practical applications in the technological arts. However, this is not the case because the independent claims are limited to the practical application of detecting anomalies in the transmission of messages by an entity. Also, the invention of the present application is disclosed

in the specification with respect to specific examples which are practical applications of a method. For example, detection of potentially fraudulent transmission of mobile telephone messages (see page 2 paragraph 2, page 36 paragraph 2, page 43 paragraph 3 and page 52 of the present application).

The Examiner states that "ultimately, numbers are returned without practical application in the arts". The claimed method detects anomalies in the transmission of messages. An anomaly in the transmission of messages is not an abstract idea. If an anomaly in the transmission of messages were to be an abstract idea then a discrete dollar amount or a share price would also be an abstract idea. This must be incorrect because the court held in *State Street* that discrete dollar amounts and share prices were useful, concrete and tangible results.

In the Applicant's opinion the present application does detail the associated practical application with the kind of specificity the Federal Circuit used in *State Street*. The present application discloses specific examples which are practical applications of the claimed method and references to places in the text which give these examples is given above.

The invention of the present application is a practical application as evidenced by the examples of detecting fraudulent telephone calls described in the specification. It is submitted that all inventions stem from or can be abstracted back to "ideas" or "manipulation of ideas" but that in the present application, practical factors are incorporated in order to create practical implementations of ideas, for example, to detect potentially fraudulent telephone messages.

On page 3, paragraph 2, the Examiner rejects claims 1 to 8 and 12 under 35 U.S.C. §102 as being anticipated by Hunt et al. (U.S. Patent No. 5365574). This rejection is respectfully traversed for the following reasons.

Claim 1

Hunt et al describe a voice recognition and verification system. A caller who wishes to gain access to services via a telephone network, enters a spoken password which is made up of a plurality of digits. A voice recognition algorithm is used to recognize the spoken digits, independently of the individual caller. If the password is valid, a voice verification algorithm is used to check that the caller is known and is authorized to access the services.

Claim 1 specifies a method of detecting anomalies in the transmission of messages by an entity. However, Hunt et al do not describe a method of detecting anomalies. Rather, Hunt et al are concerned with recognizing spoken digits and checking that a speaker's voice matches known information about that speaker's voice.

Claim 1 specifies that information relating to the transmission of message by the entity is stored. Hunt et al describe storing information about speaker's voices and digits spoken by a plurality of speakers but this is not information relating to the transmission of messages. Rather it is information about voices and digits.

Claim 1 specifies that an anomaly detector is used. However, Hunt et al do not describe use of an anomaly detector. The voice recognition and voice verification algorithms used by Hunt et al search for known patterns or information about digits and voices rather than searching for anomalies.

At column 7 lines 15 to 17 of Hunt et al, a feature extractor 60 is described. This takes voice information and outputs zero crossing rates and fast Fourier transform coefficients. Claim 1 specifies that a signature is created comprising a plurality of parameters relating to the transmission of messages over a time period. The feature extractor 60 uses voice information which is not information about the transmission of messages over a time period.

Claim 1 goes on to specify that at least one parameter is related to transmission of messages over a portion of the period and also related to the position of the portion in the period. Presumably the feature extractor 60 of Hunt et al takes voice information over a period of time. However, Hunt et al do not describe extracting a feature which is related to transmission of messages over a portion of the period and also related to the position of the portion in the period.

At column 7 lines 43 to 47 of Hunt, a tertiary feature calculation routine 65 is described. Lines 52 to 54 of column 7 of Hunt explain that the output of this routine 65 is a tertiary feature vector of approximately 300 data points per utterance. The output of the feature extractor 60 is approximately 4000 data points per utterance. Thus the feature extractor 60 and tertiary feature calculation routine 65 both give outputs per utterance; that is they both operate for time periods of one utterance or more. This means that the tertiary feature calculation routine 65 cannot be said to produce parameters related to a shorter time period than for the feature extractor 60. Thus Hunt et al do not describe "creating a second signature comprising a plurality of parameters related to the transmission of messages over a second period *shorter than the first and more recent than the first*".

At column 7 lines 64 to 68 of Hunt the process of multiplying the tertiary feature vector with voice recognition feature transformation data is described. The examiner states that this is equivalent to updating the first signature by a weighted averaging with the second signature. This is not the case because a multiplication is not a weighted averaging. Also, in the Office Action (page 3, point 2, paragraph 3) the Examiner has previously argued that the tertiary feature vector is a "second signature" and that the output of the feature extractor 60 is a "first signature". It is not possible for the Examiner to now change his position and argue that the second signature is in fact the voice recognition feature transformation data.

Hunt et al (at column 8 lines 9 to 54) does not describe inputting signatures to an anomaly detector because the algorithms described in Hunt et al are not anomaly detectors.

Hunt et al (at column 8 lines 9 to 54) does not describe detecting unexpected patterns in the transmission of messages by an entity over a time period, because Hunt et al is concerned with recognition of digits and checking that a voice matches one of a list of known voices. These digits and voices are not transmission of messages.

For these reasons it is submitted that claim 1 is not anticipated by Hunt et al.

Claim 2

At column 8 lines 10 to 19, Hunt et al describes the voice recognition class reference data. The Examiner has already argued that the first signature is the output of the feature extractor 60 (see page 3, point 2, paragraph 2 of the office action). The Examiner cannot now argue that the first signature is something else i.e. the voice recognition class reference data. Even so, the voice recognition class reference data is not described as being created in one of a plurality of possible formats.

Claim 2 is believed to be allowable over Hunt et al by virtue of its dependency and the feature of claim 2 is also allowable over Hunt et al for the reasons given above.

Claim 3

At column 7 lines 35 to 42 of Hunt et al, the process of locating voicing boundaries is described. This does not disclose a first signature where the format of that signature comprises the length of that signature as specified in claim 3.

Claim 3 is therefore allowable over Hunt et al by virtue of its dependency and the feature of claim 3 is also allowable over Hunt et al for the reasons given above.

Claim 4

At column 7 lines 17 to 20 of Hunt et al, the feature extractor 60 is described. This feature extractor 60 extracts zero crossing rates and fast Fourier transform coefficients. These zero crossing rates and fast Fourier transform coefficients do not represent the number of events made in a portion of a time period as a proportion of the total number of events made in the whole time period.

Therefore claim 4 is allowable by virtue of its dependency and the feature of claim 4 is also allowable over Hunt et al.

Claim 5

At column 7 lines 17 to 26 of Hunt et al, the feature extractor 60 is described. The zero crossing rates and fast Fourier transform coefficients do not represent the number of events of a predetermined type made in the time period as a proportion of the total number of events (of any type) made in the time period.

Therefore claim 5 is allowable by virtue of its dependency and the feature of claim 5 is also allowable over Hunt et al.

Claim 6

Claim 6 is allowable by virtue of its dependency on claim 1.

Claim 8

Claim 8 is allowable by virtue of its dependency on claim 1. The feature of claim 8 is also allowable over Hunt et al because Hunt et al do not describe use of a neural network.

Column 7 lines 64 to 68 of Hunt mentions a voice recognition linear transformation routine which multiplies a vector by a matrix. This is not a neural network.

Column 9 lines 28 to 47 of Hunt describes calculating an ensemble distance as a weighted combination of sorted distances. This is not a neural network. The equation at column 9 line 31 of Hunt et al does not describe a neural network. Hunt et al specify that the voice recognition algorithm 48 of their system uses a statistical recognition strategy (column 6 lines 45 to 48). A statistical recognition strategy is not a neural network. Also, the Examiner has previously accepted that Hunt et al do not mention the term "neural network". The equation at column 9 line 31 of Hunt et al is part of a verifier routine in which digits of a spoken password are compared with reference data vectors that are stored in a database 55. This method involves computing a weighted Euclidean distance for each digit and then combining these distance values to form a single ensemble distance value. This method does not involve inputting data to a neural network and it is respectfully submitted that no clear and unmistakable direction to use a neural network is given.

Claim 12

Claim 12 is directed to a computer system and corresponds to claim 1. Therefore claim 12 is allowable over Hunt et al for the same reasons as for Claim 1 discussed above. For example, Claim 12 specifies that the computer system is for detecting anomalies in the transmission of messages. This is not the case for the voice recognition and voice verification systems of Hunt et al.

Lines 35 to 41 of Column 7 of Hunt describe a phonetic segmentation routine 64. This is not an anomaly detector as specified in claim 12. The phonetic segmentation routine 64 presumably breaks the speech input down into individual phonemes and this does not involve detecting anomalies.

Even if the phonetic segmentation routine 64 were to be considered an anomaly detector it does not receive inputs from first and second signatures as specified in claim 1. The Examiner argues that the second signatures are comprised of tertiary features in Hunt et al. However, the tertiary features are not input to the phonetic segmentation routine 64.

Lines 30 to 41 of column 7 of Hunt et al describe the detection of voicing boundaries. This is not equivalent to detection of anomalies or unexpected patterns in the transmission of messages because the voicing boundaries are expected.

Claim 13

Claim 13 specifies a method of deriving anomalies and is similar to claim 1. Claim 13 is therefore allowable over Hunt et al for the same reasons as for claim 1.

Claim 22

Claim 22 is directed to a computer system and corresponds to method claim 13. Claim 22 is therefore allowable over Hunt et al for the same reasons as for claim 13 and for claim 1.

In paragraph 4 of the Office Action, the Examiner rejects claims 9, 13 to 19 and 22 under 35 U.S.C. §103 as being obvious over Hunt et al combined with Peterson et al (U.S. Patent No. 5067095). This is respectfully traversed for the following reasons.

The Examiner's arguments in this section of the Office Action are based on the assumption that Hunt et al discloses the conventional use of neural networks to extract characteristic signatures from voice data. However, it is respectfully submitted that Hunt et al does not disclose the use of neural networks for the reasons given above.

Peterson describes a neural network system for recognition and synthesis. It is not concerned with detecting anomalies in the transmission of messages. Because of this the skilled person would not have considered Peterson. This also applies to Hunt et al.

The Examiner states that Hunt et al discloses all the features of claims 9, 13 to 19 and 22 except for a time averaged feature vector. However, there are many other features of these claims which are not disclosed in Hunt et al, as described above. For example, neither Hunt nor Peterson et al describe creating two signatures, one over a longer period of time than the other and then updating these using a weighted averaging. Therefore the present invention, as specified in the independent claims is not reached by combining Hunt and Peterson.

Peterson et al use a time averaging circuit 178 (see column 10). This is not described as creating two signatures and updating these using a weighted averaging. Thus the time averaging circuit 178, if used in the system of Hunt et al would not produce the present invention as claimed and it is not known whether such a system would work. Presumably such as system would not work because the time averaging circuit 178 is specifically designed to operate in the system of Peterson et al.

For these reasons, and the reasons given in previous responses to Office Actions, the claims are inventive over Hunt et al combined with Peterson et al.

In paragraph 5 of the Office Action, the Examiner rejects claims 10, 11, 20 and 21 under 35 U.S.C. §103 as being obvious over Hunt et al combined with Peterson et al (U.S. Patent No. 5067095). This is respectfully traversed for the following reasons.

The reasons given above as to why the skilled person would not have considered Hunt et al and Peterson et al, or would not have combined these references, apply equally here.

The Examiner again states that Hunt et al discloses the conventional use of neural networks. This is not the case for the reasons given above.

The Examiner states that Peterson et al describes predictive modelling. While it is accepted that Peterson et al mentions prediction, it is submitted that the Peterson reference, taken as a whole is directed to recognition and synthesis, for example of voice or vision signals (see figure 2 column 19 lines 38 to 45). This involves, for example, recognizing words or line segments. For example, at column 10 lines 50 to 56 of Peterson et al it is explained that a feature map 64 predicts the next state of a first input signal in order to recognize a known pattern of the first input signal. This differs from detecting anomalies in the transmission of messages. Because of this the skilled person would not have considered Peterson when developing the present invention.

Also, Peterson et al describe a very complex neural network system which involves interconnecting several modules (see abstract). This would have directed the skilled person away from considering Peterson et al.

Even if the skilled person had considered Hunt et al in combination with Peterson et al he or she would not have reached the present invention. This is because neither of these references describe creating two signatures, one over a longer period of time than the other and then updating these using a weighted averaging as specified in the claims.

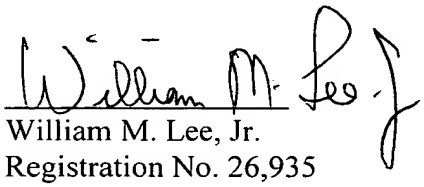
For these reasons, claims 10, 11, 20 and 21 are submitted to be allowable over Peterson et al even when combined with the teachings of Hunt et al.

In further support of the above, the Applicant is going to supplement this response in a couple of days with a declaration of Katherine Butchart. That declaration is being finalized, and is not quite ready. In her declaration, Ms. Butchart further deals with the Hunt and Peterson references, and explains their inapplicability and supports the conclusions reached above.

It is therefore submitted that this application is allowable over the prior art, and the Examiner's further and favorable reconsideration in that regard is urged.

July 21, 2000

Respectfully submitted,



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